

# THE OPERATIVE TREATMENT OF CANCER OF THE LARGE INTESTINE, CAUSING DANGEROUS INTESTINAL OBSTRUCTION.\*

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WHEN one reviews the conditions of the large intestine requiring surgical treatment, the subject of intestinal obstruction is at once presented for consideration. These cases are frequently in elderly patients due to occlusion of the lumen of the intestine by carcinomatous growths. The lesion is situated in the intestinal wall and presents in its earlier stages almost no characteristics which can be detected by physical examination. It is usually found in the descending colon and is adenocarcinomatous in character. The symptoms may be indefinite for a long time, and not until the occlusion is marked does the spasmodic pain, vomiting, distention, etc., present the clinical picture resulting from marked interference with fecal circulation. These cases, since they are usually not seen by the surgeon till he is called to relieve the obstruction, present the following complications:

1. The difficulty in determining the cause of the patient's condition.
2. The difficulty of determining its location.
3. The danger to the patient of shock from the prolonged difficult exploration often necessary to ascertain accurately the above-mentioned facts, and from the operative procedure required to radically relieve him.

For purposes of illustration I report the following

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\* Read before the American Surgical Association, May 30, 1906.

clinical history of a case in which the colon was resected to relieve dangerous intestinal obstruction due to cancer.

The patient was a single man, forty-eight years of age, of Scotch parentage, and a laborer by occupation, who was admitted to my service at the Boston City Hospital on February 15, 1904. He gave the following history: That he had been well till fifteen years ago. He then suffered an attack similar to the present one, but less severe in character. For the last ten to twelve years there has been habitual constipation, necessitating the more or less constant use of cathartics. In 1894 a right scrotal hydrocele was noticed, which has been tapped each year since. It is now of large size. In 1902 he had an attack of pleurisy, after recovering from which he was apparently well till February 10, 1904, on which date the attack began which forced him to seek relief. This attack was characterized by abdominal pain which at intervals became quite severely acute or "cramp-like," and was referred to the subumbilical region. For three days (February 7-10) previous to this attack there had been no dejection. On February 11th enemata were followed by a dejection. From February 11th to the 15th the bowels moved once daily, the dejections being small in amount, and consisting of hard, fecal masses, but no mucus or blood. There was slight nausea, and vomiting after food even in small amounts. The pain after the first of the attack almost disappeared. There was anorexia and loss of strength. On February 15th he entered the hospital.

When examined he seemed to be in a fairly good general condition. His expression was somewhat anxious. Tongue was covered with a white, creamy coat. Glands not especially enlarged. Heart and lungs negative. There was a very large scrotal hydrocele. Temperature was 100.5; pulse 80. In the right side of the abdomen over the kidney-shaped area shown in Figure 1, there was fullness and a marked tympanitic resonance. Abdomen elsewhere was only moderately distended.

During the 16th, 17th and 18th of February, under treatment, the subjective symptoms were relieved. Temperature 98 to 99.5°. Pulse, 80, 72, 85, 100. The patient was quite comfortable. He occasionally vomited after taking liquid food. High enemata (twice a day) produced slight results. The swell-

ing and tympanitis increased slowly, as shown in Fig. II. On February 19th vomiting began to occur every few hours, becoming fecal in odor and character. The abdomen rapidly distended and became tympanitic. The condition of the right side changed as shown in Fig. III. Temperature  $99.5^{\circ}$ , pulse 100-102. This rapid change for the worse required radical treatment, but the

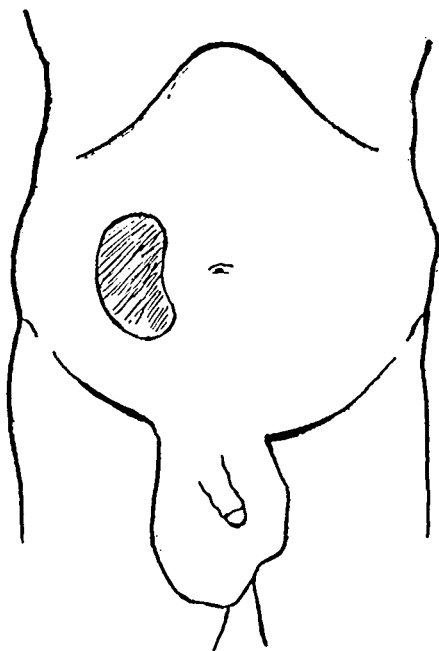


FIG. 1.—Shaded kidney-shaped area shows site of special intra-abdominal fulness and tympanitic resonance.

consent of the patient for operation was not obtained till 6 P.M. on the 20th. An attempt was then made to find the obstruction and relieve it. The patient's general condition was at that time rather poor. There were signs of exhaustion. Temperature  $99.6^{\circ}$ ; pulse 100-105. Face anxious. Symptoms of the 19th still existed. The abdomen was well distended. On the right the conditions shown in Fig. III were present. The apparent

tumor seemed fully four inches in diameter and extended from the costal border to the iliac region.

Under ether an incision in the median line extending from the navel towards the pubes opened the abdomen. The tensely distended loops of intestine at once protruded, rendering exploration of the abdomen exceedingly difficult. An attempt was made to overcome this difficulty by incising one or two loops

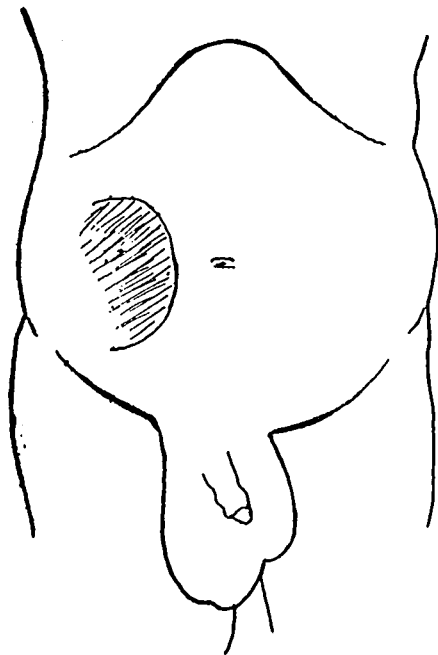


FIG. 2.—Increasing swelling and tympanites, three days subsequent to condition shown in Fig. 1.

along the free border in hope that after their contents had been evacuated the intestine would collapse enough to give room for the hand in the abdomen. But although about 500 cc. of liquid fæces were thus removed, the remaining coils of gut were little, if any, affected and still rendered any exploration of the abdomen exceedingly difficult. This failure to empty the intestine

promptly under the above conditions has since been quite satisfactorily explained by the careful study of intestinal anatomy by Dr. George H. Monks (*ANNALS OF SURGERY*, vol. xxxvii, p. 543, October, 1905).<sup>1</sup>

After waiting in vain for the intestine to be emptied the incisions in the gut were sutured and the abdomen explored as

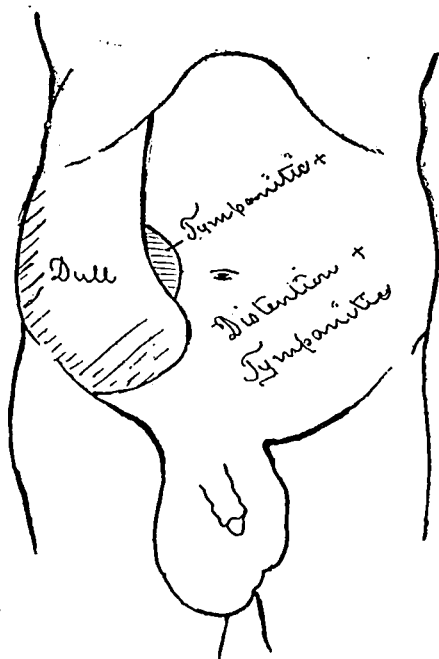


FIG. 3.—Condition on fourth day subsequent to date of Fig. 1.

well as possible, in spite of the interference from the distended coils of intestine which still filled it. No band, twist, tumor, intussusception, or other obstruction could be found. The condition of the abdomen previous to operation, shown by Fig.

<sup>1</sup>The Mütter Lecture on the Surgical Anatomy of the Small Intestine and Mesentery, delivered at the College of Physicians of Philadelphia, by Dr. George H. Monks on December 2, 1904.

III, was found due to an enormously distended cæcum and ascending colon, for which no cause was discovered.

On account of the patient's general condition becoming alarming, which left no time for further exploration for the cause of the obstruction, the search was abandoned and all efforts directed to the end that the patient might leave the operating-room alive. To accomplish this the cæcum was rapidly exposed through an oblique incision of the superjacent abdominal wall. It was then sutured in the wound so as to close off the peritoneal cavity, and opened by a one-inch incision. Two or three litres of liquid, pea-soup-like fæces were evacuated.

A rubber tube was now fastened into the colon wound by two superimposed purse-string sutures, and the wound after being loosely packed with iodoform gauze was partly closed with two silkworm-gut sutures. The median incision was closed with "through-and-through" silkworm-gut sutures. The patient was then put to bed with syphon drainage of the colostomy wound.

There was marked shock, but the patient recovered from the ether and slowly reacted under treatment. On February 21st, the day following the operation, the temperature was  $101.2^{\circ}$ , and the pulse 128-129. The intestine gradually emptied itself through the tube in the colon into a bottle hung at the bedside, and the obstructed intestine was temporarily relieved. The vomiting ceased at once after the operation. The abdominal pain also disappeared promptly.

On February 24th the temperature had gradually dropped to  $99.5^{\circ}$  and the pulse to 98-105. The colostomy tube was removed and the lower bowel was cleaned by a high enema. On the night of the 24th, without any apparent reason, the patient twice got out of bed. During the succeeding days the patient continued to improve and gradually became stronger. The median incision was healed on March 7th. The colon wound closed in so that on March 20th it barely admitted the little finger. In the early part of April the patient's general condition had markedly improved. He was up and about daily. There was still a fecal discharge from the colon opening. It was then found that unless the intestine was emptied by laxatives and enemata every second day, symptoms of obstruction would begin to appear. It, therefore, seemed indicated that another

attempt should be made to locate and remove the persisting obstruction. The data obtained from observation of the case seemed to indicate that it was probably a neoplasm situated in the wall of the intestine and filling its lumen. On account of the distention of the colon at the time of the first operation being limited to the ascending portion, the hepatic flexure was probably its location. Therefore, on April 13th, after careful feeding and preparation, a second operation was performed.

Under ether the abdomen was opened in the median line above the navel by an incision (which before the exploration was completed was enlarged so that it extended from just below the sternum to the umbilicus) and explored.

Bands of adhesions between the intestine and the abdominal wall appeared. The separation of one of these caused an injury to the gut-wall which was closed by a continuous silk suture. The intestine was empty. Contrary to expectation, careful examination of the transverse colon and vicinity failed to discover anything abnormal. There was no obstruction at that point. Finally, after exploring the whole abdomen carefully without result, suddenly a small, hard, movable mass was by chance felt in the left iliac region. This was apparently a small indurated section of the gut, probably a tumor, involving the intestinal wall.

An oblique incision four inches long was now made in the left lower quadrant of the abdomen over the growth, and through this wound the mass was exposed. It proved to be a tight, annular stricture of the intestine at the junction of the descending colon with the sigmoid flexure. It involved the entire circumference of the intestine, forming a band about 2 cm. wide, which showed a well marked constriction. The growth was apparently well localized. With considerable difficulty it was "walled off" with aseptic gauze, isolated by rubber bands passed through the mesentery and clamped, and about two inches of colon with its adjacent mesentery resected. No affected lymph-nodes were found. The intestine was then closed by an "end-to-end" union. This was made with a "right-angle" continuous fine-silk suture, reinforced at two points by a single Lembert stitch. A very thick, fat mesocolon and the slight mobility of the growth interfered much with the application of the suture. The abdominal wound was then closed by nine deep catgut and an

interrupted superficial silkworm-gut suture. The median wound was united by "through-and-through" silkworm-gut sutures. No drainage. Dry aseptic gauze dressing.

The operation lasted one and one-half hours, but was followed by very little shock. The recovery from ether was good, and after the first twenty-four hours the patient did well. During the next few days he was quite comfortable. There was practically no fecal discharge from the colostomy wound after the operation.

The recovery from the operation was uneventful. On the fourth day the temperature and pulse reached normal and remained so. The highest temperature,  $101.8^{\circ}$ , was on the night following the operation. The highest pulse-rate, 120, was recorded twenty-four hours later. The patient's general condition steadily improved and his strength increased. After the operation no cathartics or enemata were used till April 29th. There was a spontaneous normal defecation on the seventh day. The operation wounds healed by primary union. Patient got up on the twenty-third day. The artificial anus closed spontaneously on the eleventh day after the colon was resected and the obstruction removed. On May 5th the colostomy wound was completely healed.

The patient rapidly gained in strength and weight, and was discharged apparently well on May 9, 1904.

Examination of the resected intestine showed the excised tumor to be situated in the intestinal wall, and by its growth to have so occluded the lumen of the intestine as to leave an opening only 2-3 mm. in diameter. The microscopic examination made under the direction of Dr. F. B. Mallory, at the Pathological Department of the Boston City Hospital, showed the tumor to be an adenocarcinoma, and that it apparently had been resected well beyond the limits of the growth.

The patient has continued under observation till the present time, a period of two years since the removal of the cancer. He has had very little discomfort during this period and is apparently well. It was four or five months before he fully regained his strength. On May 3, 1906, I could detect no signs of recurrence. He states that there has been at times some discomfort at the site of the colostomy wound. This gradually became much less frequent than at first, and at present is scarcely



noticed. He says that he "can feel everything that he eats passing through there." The intestine acts normally, one daily defecation without the aid of medicine. He has recently increased in weight thirty pounds. Examination of the abdomen is negative. The scars are firm and do not bulge on coughing. (Fig. 4.) There is no tenderness.

The prognosis in this case is good, since the possibility of removal and freedom from recurrence—if not permanent, at least for a term of years—in cases of this form of adenocarcinoma of the colon, has been demonstrated, especially where the growth has not spread outside the intestine. There are results of this character on record, and such has been the result of those cases which have come under the personal observation of the writer.

The above record is a fair example of one type of colon obstruction, and when considered in detail presents certain features which seem worthy of attention, viz.:

1. It is important to recognize the character of the obstruction, whether it is transitory or permanent. Accumulated feces resulting from chronic constipation due to functional causes can present a clinical picture similar to organic obstruction in the earlier stages. Chronic obstruction is more apt to be obscure. The symptoms and clinical picture are not so characteristic as in the acute cases, such as strangulation, volvulus, intussusception, etc. In cancer, as a rule, the occlusion is so gradual that a diagnosis is usually made only after the obstruction has so occluded the intestine as to produce marked symptoms—pain, nausea, vomiting, distention, complete constipation. In elderly people a history of persistent constipation requiring the more or less constant use of drugs should always attract attention and the possibility of cancer of the colon be considered.

2. Equally important is a recognition of the site of the obstruction. This is often difficult since the abdomen is a region where the anatomy and pathological physiology of its contents are varied and complex. Data obtained by exter-

nal examination cannot always be accurately interpreted. For instance, it is usually accepted that an obstructed gut is distended above and collapsed below the point of obstruction. In the case just reported both external and internal examination showed the colon with marked distention as far as the hepatic flexure, while beyond that point it was of normal size, if not smaller. Yet notwithstanding this the lesion causing the obstruction was low in the descending colon. For this condition no wholly satisfactory reason has been suggested.

Again, this lesion may be so small, affecting only the intestinal wall, as to be readily overlooked by the surgeon during exploration, especially when the abdomen is filled with distended coils of intestine. It must be actually seen or felt to be recognized. Many instances have been recorded where a condition apparently probable from clinical data at hand has been found by exploration not to exist in fact. Hence the difficulty of locating such an obstruction.

3. Another problem presented to the surgeon is the expediency of finishing the operation in one or two sittings. In suitable cases there is no question but that a single operation is to be preferred. When the patient's general condition is good, and the wall of the intestine normal or nearly so, a growth can be excised at once, but in many of the cases certain conditions obtain which are unfavorable for immediate resection.

First. The ability of the patient to endure the severe shock resulting from the prolonged manipulation. A patient is often already in a critical condition from the effects of his illness. If he can be temporarily relieved by some expedient, as an enterostomy or colostomy, the operative exposure is diminished and a life saved which otherwise would be lost.

Second. The conditions for exploration and resection are much more favorable for efficient thorough work at the second operation. It is performed in an abdomen containing only an empty intestine in place of an extremely dis-

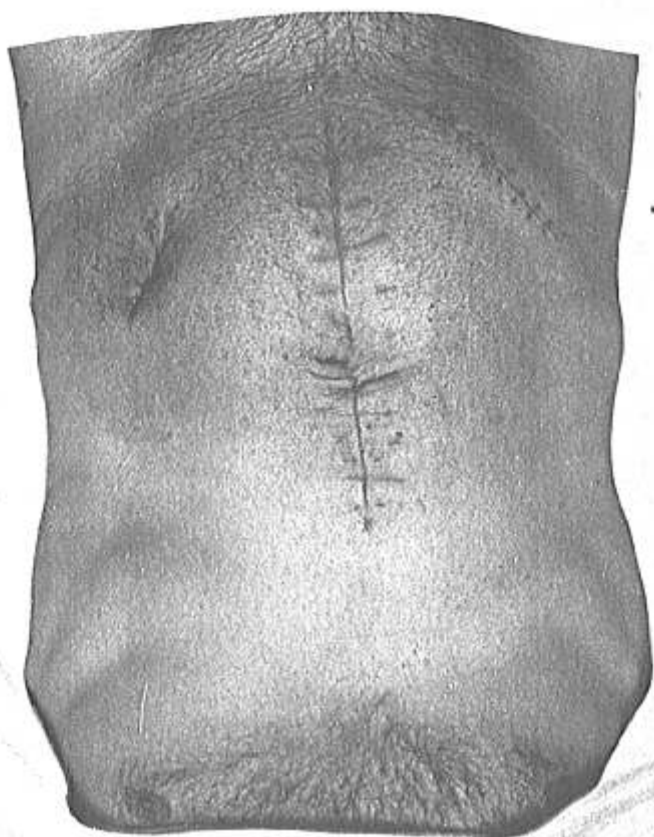


FIG. 4.—Showing scars left after repeated abdominal sections for relief of intestinal obstruction.

tended one. It is performed more easily, since the operation is not impeded, and consequently is finished much more rapidly. All of which, of course, shortens the exposure and diminishes the shock. By the temporary relief obtained from the first operation there is an opportunity for the patient to recover and he will therefore be in a much better general condition to endure the second. In the case reported, if the attempt to find the obstruction and resect the colon had been persisted in at the first operation the patient would probably have died at once.

Third. The chances of successful union are much greater when a normal empty intestine is sutured than when a semi-paralyzed one full of stagnant feces, toxins or ptomaines, is the site of operation. At the primary operation the intestine is apt to be dilated, its muscle exhausted, its wall thickened and cedematous, the contents especially septic; in short, the whole situation is most unfavorable for successful wound union. In a recent article on this subject Dr. J. W. Elliot<sup>1</sup> states that the mortality from the usual operation of enterectomy with immediate suture is 50 per cent. at least in the hands of the best surgeons, and in some hospitals as high as 85 per cent. The principal cause of death is septic peritonitis, due sometimes to infection by intestinal contents at the operation, but more often to the fact that the most perfectly placed sutures or mechanical devices do not hold. He attributes the giving way of the suture to the diseased condition of the bowel at the time of operation. He recommends enterostomy or colostomy, with later enterectomy, in patients unable to bear primary enterectomy, and regards this as the operation of choice in all critical cases of intestinal obstruction. The method of operation in two sittings is not new. It has been practised and published by many surgeons of note, but notwithstanding this its value is still often lost sight of in the surgeon's

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<sup>1</sup> ANNALS OF SURGERY of 1905, Vol. xlii. p. 668. "The Management of Certain Critical Cases of Intestinal Obstruction, with Report of Cases."

zeal to complete his work at one sitting. But in these cases temporary relief is of far more immediate importance than the removal of the disease. I therefore wish to emphasize the importance of this method.

Fourth. Another fact to be considered is the futility of an attempt to rapidly empty a distended, half-paralyzed intestine by incising separate coils. Such incisions have only an immediate local effect. To accomplish the desired object the drainage must be continued for several hours. The surgeon cannot wait so long for the necessary result. The slow emptying of the incised gut, as Dr. Monks has explained, is caused not only by the sharp curves and kinks which the mesentery causes in a distended intestine, but also to external pressure and especially to the gas and semi-liquid contents which act like plumbers' traps. The fluid portions are in the dependent loops and obstruct the passage of gas. The gas is in the upper part of the coil and cannot pass the liquid. Neither gas nor liquid can pass on without the peristaltic wave, which is absent in a paralyzed gut. But when an artificial anus is made and continual drainage through a tube is established, the intestine after a time is able to empty itself and gradually recovers. Both the above facts were demonstrated in the case of the patient under discussion,—*i.e.*, the futility of immediate and the success of continued drainage.

Fifth. The question arises also in these cases, where first a palliative and after relief a second radical operation is performed, as to the comparative value of internal procedures, such as lateral anastomosis for the purpose of "side-tracking" the obstruction, or of the method of external drainage, as by a colostomy. Some operators prefer the internal method; others select the internal for the less severe cases and the external for the extreme ones; while another set prefer the external in nearly all cases. There can be no question that in some cases where the intestine is in good condition this internal method can be safely performed and possesses advantages which readily suggest

themselves. But in the severe cases where the gut is in an abnormal condition the "external" drainage has more advantages. One has positive knowledge that the drainage is efficient. If necessary it can be assisted. It has also occurred that a section of paralyzed gut from absence of peristalsis has caused as effective an obstruction as a strangulation, and unless the anastomosis in such a case is beyond the paralyzed area the patient would not be relieved. Again, operations done on intestines under these conditions and with contents of such a character are often followed with marked local reaction. I have seen the resulting oedema at the point of suture so great as to occlude an opening having the same lumen as the gut. By the external method such changes can be at once noted and treated. One always has a much more accurate knowledge and control where local conditions are open to inspection and manipulation. Therefore, it would seem wise to employ the "external" method unless the surgeon can feel sure that the condition of the intestine is normal or nearly so at the point of suture. There is no objection to the temporary fecal fistula from fear that it cannot be closed. The tendency is to spontaneous closure after the obstruction is relieved. In this case it closed spontaneously on the eleventh day. If this does not occur it can usually be closed by operation. The objection has been made that the presence of an open fecal fistula greatly increases the danger of infection at the second opening of the abdomen. It is true that this danger exists, but by proper preparation and technique it can be avoided. In the case reported an extended exploration of the abdomen was made through a median incision and the colon was resected through an iliac incision notwithstanding a fecal fistula had been emptying the cæcum on the right side up to the day of the operation.

It is also claimed that the delay resulting from postponing the radical operation offers an opportunity for increased growth and extension of the neoplasm, and for the production of pathological changes in the adjacent tissues

unfavorable for operation. On the other hand, however, in those cases where the tumor is found it can generally be isolated and sutured outside the abdomen by one of the several methods already in use. Then at the second operation the growth can be excised and the colostomy opening closed. When the obstruction cannot be found the operator has, of course, no choice. He must drain externally. He has nothing to resect.

Sixth. In conclusion I would call attention to the method of multiple incisions for an extended exploration of the abdomen in place of a single long incision. By this method important structures, such as nerves, vessels, and muscles, remain uninjured and the patient escapes the disagreeable after-effects of such injuries. Also an incision directly over the area in question gives direct access to the site of operation in place of the indirect approach obtained only by powerful retraction of the edges of an incision placed at a distance. No single incision can be placed in the abdomen which will possess the above-mentioned possibilities without much increased risk to the patient and injury to important structures of the abdominal wall. The accompanying photograph (Fig. 4) shows the results of this method.<sup>1</sup> The two wounds in the median line overlap so that the resulting scar is only two inches shorter than the distance from the xyphoid tip to the pubes. There is a four-inch oblique scar in the left iliac region and a rather broad, depressed, three-inch oblique cicatrix in the right iliac area at the former site of the temporary artificial anus. All are firmly healed and show no tendency to hernia. The tonicity of the muscles is apparently normal.

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<sup>1</sup> This photograph was taken on May 12, 1904. The resection wound now appears almost as a line scar, with no suture marks. The photograph shows a reversed or "mirror" picture, the right colostomy scar appearing on the left, and the left resection wound appearing on right